



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,447	02/10/2004	Hyung-Guen Lee	04-02	3700

22443 7590 11/05/2007  
LAW OFFICE OF MONICA H CHOI  
P O BOX 3424  
DUBLIN, OH 430160204

EXAMINER
----------

HERNANDEZ, NELSON D

ART UNIT	PAPER NUMBER
----------	--------------

2622

MAIL DATE	DELIVERY MODE
-----------	---------------

11/05/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/776,447

Applicant(s)

LEE, HYUNG-GUEN

Examiner

Nelson D. Hernandez

Art Unit

2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-14 and 16-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,7,9-14,16,17,19 and 21-27 is/are rejected.
- 7) ☒ Claim(s) 6,8,18 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

1. The Examiner acknowledges the amended claims filed on June 29, 2007.

**Claims 1, 2, 13, 14, and 25-27** have been amended. **Claims 3 and 15** have been canceled.

### *Response to Arguments*

2. Applicant's arguments with respect to **claims 1, 2, 4-14, and 16-27** have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

6. **Claims 4 and 16** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. **Claim 4** recites the limitation "The method of **claim 3**, further comprising: ...".

There is insufficient antecedent basis for this limitation in the claim. The claim appears to depend from canceled **claim 3**.

4. **Claim 16** recites the limitation "The system of **claim 15**, wherein ...". There is insufficient antecedent basis for this limitation in the claim. The claim appears to depend from canceled **claim 15**.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1, 11, 13, 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Embler, US 2004/0160045 A1 in view of Laney, US Patent 5,668,932.**

**Regarding claim 1**, Embler discloses a method for luminance noise filtering, comprising: inputting a region (pixel neighborhood; page 2, ¶ 0028) of pixel data from an image sensor (Fig. 3; 33; page 3, ¶ 0033); and determining a virtually filtered luminance (Reference pattern) from a first processing of said region (stored in Ref. Pattern Store 46 as shown in fig. 46; see also fig. 6; page 3, ¶ 0031-0038) of pixel data for a pixel location within the region; and determining a reference luminance for the pixel location from a second processing of said same region of pixel data and without using other pixel data (Local neighborhood pattern around the interpolated pixel, see page 3, ¶ 0031) (Page 2, ¶ 0028-0029, page 3, ¶ 0030-0039; page 4, ¶ 0040-0042).

Embler does not explicitly disclose that said virtually filtered luminance is determined without using other pixel data.

However, Laney discusses the concept of determining the luminance of a particular pixel that belongs to a region having a plurality of pixels and comparing a calculated average luminance of the region of pixels to the determined luminance of said particular pixel to adjust the pixels when it's luminance is brighter or dimmer than the average luminance of the region (See figs. 2-4; col. 1, line 31 – col. 2, line 24).

Therefore, taking the combined teaching of Embler in view of Laney as a whole, it would have been obvious to one of an ordinary skill in the art at the time the invention was made to modify Embler by calculate the virtually filtered luminance using only the pixel data of said particular region. The motivation to do so would have been to reduce the amount of circuits needed to store luminance data, thus reducing the cost of materials needed in a system performing the noise correction method while improving the effectiveness of the system by performing corrections tailored for different images by calculating said correction for every image.

**Regarding claim 11**, Embler discloses that the virtually filtered luminance is determined by averaging a respective pixel data multiplied with a respective weighting coefficient for each pixel location of the region (Embler discloses using various luminance gradient possibilities within the selected neighborhood configuration (page 2, ¶ 0029 – page 3, ¶ 0032), by teaching this, Embler discloses that the virtually filtered luminance is determined by averaging a respective pixel data multiplied with a respective weighting coefficient for each pixel location of the region since the different

pattern is weighted different in order to compare a plurality of said patterns with the local neighborhood pattern).

**Regarding claim 13**, claim 13 recites a method for the apparatus in claim 1.

Therefore, limitations can be found in claim 1.

**Regarding claim 23**, limitations can be found in claim 11.

**Regarding claim 25**, limitations can be found in claim 1.

**7. Claims 2, 4, 10, 14, 16, 22, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Embler, US 2004/0160045 A1 in view of Laney, US Patent 5,668,932 and further in view of Takahura, US 2002/0122119 A1.**

**Regarding claim 2**, the combined teaching of Embler in view of Laney teaches determining interpolated color components for the pixel location from the region of pixel data (Embler, using interpolator 34 as shown in fig. 3; page 2, ¶ 0027 and page 3, ¶ 0034) but fails to teach that said reference luminance for the pixel location is determined from the interpolated color components.

However, Takahura teaches the concept of determining the luminance values from interpolated color components (Red, Green and Blue) with the purpose of using the calculated luminance to remove noise and perform picture quality adjustment to a photographed image (Page 4, ¶ 0057-0059).

Therefore, taking the combined teaching of Embler in view of Laney and further in view of Takahura as a whole, it would have been obvious to one of an ordinary skill in the art at the time the invention was made to modify Embler and Laney by determining

said reference luminance for the pixel location from the interpolated color components. The motivation to do so would have been to remove noise and perform picture quality adjustment to a photographed image as suggested by Takahura (Page 4, ¶ 0057-0059).

**Regarding claim 4**, Embler discloses selecting between the virtually filtered luminance and the reference luminance as a final luminance of the pixel location depending on an adaptive luminance (Embler discloses comparing the local neighborhood with a reference neighborhood pattern to determine whether to use the neighborhood pattern to correct the pixel or to maintain the values used in the local neighborhood to process the pixel; page 3, ¶ 0030-0032).

**Regarding claim 10**, Embler discloses that the adaptive luminance is indicated by the reference luminance (Embler discloses using the reference luminance (local neighborhood pattern) to determine the correction to be performed; page 3, ¶ 0030-0032).

**Regarding claim 14**, limitations can be found in claim 2.

**Regarding claim 16**, limitations can be found in claim 4.

**Regarding claim 22**, limitations can be found in claim 10.

**Regarding claim 26**, limitations can be found in claim 2.

**Regarding claim 27**, limitations can be found in claim 4.

**8. Claims 5, 7, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Embler, US 2004/0160045 A1 and Laney, US Patent 5,668,932 in view of Takahura, US 2002/0122119 A1 and further in view of Gindele, US Patent 6,937,72 B2.**

Regarding claim 5, the combined teaching of Embler in view of Laney and further in view of Takahura teaches determining a threshold value from the adaptive luminance (Embler discloses using the reference luminance (local neighborhood pattern) to determine the correction to be performed; page 3, ¶ 0030-0032) but does not explicitly disclose selecting the virtually filtered luminance if an absolute of a difference between the virtually filtered luminance and the reference luminance is less than or equal to the threshold value; and selecting the reference luminance if the absolute of the difference between the virtually filtered luminance and the reference luminance is greater than the threshold value.

However, Gindele teaches a method for removing noise form digital images wherein a pixel of interest (reference luminance) and a local neighborhood of pixels (virtually filtered pixels) located about the pixel of interest are identified; calculating a difference pixel value for pixels in the local neighborhood of pixels based on the absolute difference between the value of the pixel of interest and the individual values of pixels included in the local neighborhood of pixels; using the absolute difference values to calculate a noise reduced pixel value; replacing the value of the pixel of interest with the noise reduced pixel value; wherein a comparison is made between the absolute difference and a threshold value (being a function of the values of pixels included in the



Art Unit: 2622

local neighborhood) and using only the values of pixels included in the local neighborhood for which the corresponding absolute difference pixel values are less than the threshold value to calculate the noise reduced pixel value (See col. 9, line 44 – col. 11, line 26).

Therefore, taking the combined teaching of Embler and Laney in view of Takahura and further in view of Gindele as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Embler, Laney and Takahura by selecting the virtually filtered luminance if an absolute of a difference between the virtually filtered luminance and the reference luminance is less than or equal to the threshold value; and selecting the reference luminance if the absolute of the difference between the virtually filtered luminance and the reference luminance is greater than the threshold value. The motivation to do would have been to perform more efficiently noise reduction in digital images as suggested by Gindele (Col. 2, line 66 – col. 3, line 4).

**Regarding claim 7**, Embler discloses that the adaptive luminance is determined from an average reference luminance for a predetermined region of pixel data (Embler discloses using the reference luminance (local neighborhood pattern) to determine the correction to be performed; page 3, ¶ 0030-0032).

**Regarding claim 17** limitations can be found in claim 5.

**Regarding claim 19**, limitations can be found in claim 7.

**9. Claims 12 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Embler, US 2004/0160045 A1 and Laney, US Patent 5,668,932 in view of Takahura, US 2002/0122119 A1 and further in view of Raffy, US Patent 7,139,022 B1.**

**Regarding claim 12**, the combined teaching of Embler in view of Laney and further in view of Takahura fails to teach that the image sensor is part of a hand-held image pick-up device having minimized line memory capacity.

However, processing luminance in a handheld image pick-up device having minimized line memory capacity is notoriously well known in the art as taught by Raffy. Raffy teaches a digital camera (See fig. 1) comprising an image sensor (Fig. 1: 22) to capture an image of an object, said camera further comprises a line buffer (Fig. 1: 30) to store seven lines of pixels to further perform luminance processing to the stored pixel data in the line buffer (Col. 5, line 35 – col. 6, line 44; col. 13, lines 16-30). Raffy also discloses that the size of the buffer 30 would depend of the applications so it can be smaller or larger (Col. 5, lines 46-51; col. 13, lines 16-30).

Therefore, taking the combined teaching of Embler and Laney in view of Takahura and further in view of Raffy as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Embler, Laney and Takahura by having the image sensor is part of a hand-held image pick-up device having minimized line memory capacity. The motivation to do so would have been to reduce the size and cost of making the apparatus while maintaining the quality of the

images as suggested by Raffy (Col. 1, lines 19-32; col. 5, lines 46-51; col. 13, lines 16-30).

**Regarding claim 24**, limitations can be found in claim 12.

**10. Claims 9 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Embler, US 2004/0160045 A1 and Laney, US Patent 5,668,932 in view of Takahura, US 2002/0122119 A1 and further in view of Koyanagi, Us Patent 5,880,782.**

**Regarding claim 9**, the combined teaching of Embler in view of Laney and further in view of Takahura fails to teach that the adaptive luminance is indicated by an auto exposure gain for the image sensor.

However, indicating an adaptive luminance by an auto exposure gain of the image sensor is well known in the art as taught by Koyanagi. Koyanagi teaches a camera (Fig. 1) that perform luminance correction based indicated by a gain correction which is determined using an average luminance of the image and a reference luminance (Note in fig. 1 that the adaptive luminance depends from the gain value from the exposure controller 16, since the gain form the exposure controller is feedback to the image signal that is being processed by blocks 6, 7, 12, 13 and 14) (Col. 4, lines 6+; col. 7, line 13 – col. 9, line 20).

Therefore, taking the combined teaching of Embler and Laney in view of Takahura and further in view of Koyanagi as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Embler, Laney

Art Unit: 2622

and Takahura by having the adaptive luminance indicated by an auto exposure gain for the image sensor. The motivation to do so would have been to obtain a proper luminance and reference values to expose better the imaging device as suggested by Koyanagi (Col. 10, lines 40-51).

**Regarding claim 21**, limitations can be found in claim 9.

***Allowable Subject Matter***

11. **Claims 6, 8, 18 and 20** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

**Regarding claim 6**, the main reason for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that the adaptive luminance is determined from an overall brightness of a previous image, including all of the limitations of claims 1, 2, 3, 4 and 5.

**Regarding claim 8**, the main reason for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that the threshold value is greater when the adaptive luminance is lower, including all of the limitations of claims 1, 2, 3, 4 and 5.

**Regarding claim 18**, the main reason for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that the adaptive luminance is

Art Unit: 2622

determined from an overall brightness of a previous image including all of the limitations of claims 13, 14, 15, 16 and 17.

**Regarding claim 20**, the main reason for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that the threshold value is greater when the adaptive luminance is lower, including all of the limitations of claims 13, 14, 15, 16 and 17.

### ***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

**Contact**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson D. Hernandez whose telephone number is (571) 272-7311. The examiner can normally be reached on 9:30 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lin Ye can be reached on (571) 272-7372. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NDHH  
October 22, 2007

Nelson D. Hernandez  
Examiner  
Art Unit 2622



LIN YE  
SUPERVISORY PATENT EXAMINER